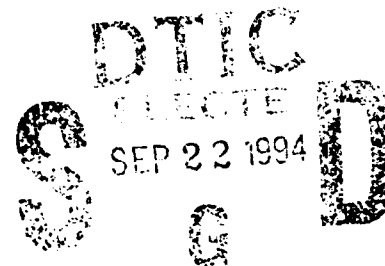# Naval Research Laboratory

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Digital Mapping, Charting, and Geodesy Analysis Program Technical Review of Digital Aeronautical Flight Information Data Prototype 1.0 on CD-ROM

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The Naval Research Laboratory's Digital Mapping, Charting, and Geodesy Analysis Program (DMAP) has performed a technical review of Prototype 1.0 of Digital Aeronautical Flight Information Data (DAFID). For the first time, this information is available on Compact Disk-Read Only Memory. The DAFID database was created to allow quicker access to the data due to its format standardization and more divided structure. It also includes a digital 28-day Global Positioning System almanac and programs in FORTRAN and BASIC for calculating magnetic data. A few recommendations for improvement are made by DMAP.

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**Digital Mapping, Charting, and Geodesy Analysis Program
Technical Review of Digital Aeronautical Flight Information Data
Prototype 1.0 on CD-ROM**

1.0 Introduction

This product evaluation was performed in order to assess the effectiveness and utility of a new database format for the Digital Aeronautical Flight Information File (DAFIF) called Digital Aeronautical Flight Information Data (DAFID). This is the first time that this information has been available on Compact Disk - Read Only Memory (CD-ROM). In addition, the disk also contained programs in FORTRAN and BASIC for calculating magnetic data, and a digital 28-day Global Positioning System (GPS) almanac. These extra features are proposed to be included with DAFID so that their access will be readily available to the users' systems.

A four page questionnaire accompanied the DAFID CD-ROM to which most of the Digital Maping, Charting, and Geodesy Analysis Program (DMAP) recommendations refer (See the Appendix). Input was also obtained from the TAMPS and MH-53 programs.

1.1 DAFID Content

The current DAFID database is organized under two directories, "Full," which contains current data, and "Trans," which contains all transaction or correction data. Under the "Full" and "Trans" directories, the data are divided under the following subdirectories:

- "Airports"
- "Boundrys" (Boundaries)
- "Navaids"
- "Waypts" (Waypoints)
- "Atsrts" (Air Traffic Safety Routes)
- "Mltrnrts" (Military Training Routes)
- "Airfuelr" (Air Refueling Track/Anchor)
- "Suas" (Special Use Air Space)

Finally, under each subdirectory, the data are divided into 21 files, one for each International Civil Aviation Organization (ICAO) region.

This structure is presented in contrast to the DAFIF database, which is organized under the following directories:

- "Fullall" (data at 18,000 ft or below)
- "Fullhi" (data above 18,000 ft)
- "Transall" (transaction data at 18,000 ft or below)
- "Transhi" (transaction data above 18,000 ft)

Each of these directories then contains 21 files that have all of the data for a single region.

2.0 Findings

The following is a list of findings and comments resulting from the review of this product.

- DAFIF records are written using as many as three different formats for each data type, whereas DAFID records use only one. Using only one format makes reading DAFID easier, and allows the user to access all of the data at once without changing formats.

- The DAFID structure is more logical than DAFIF and allows the user to go directly to the type of data needed instead of searching through all of the data for a region.

- The GPS almanac and magnetic data on the CD-ROM are useful to users because they save time and the necessity of having to go through other routes to obtain these data.

- The record length parameter "0208" is constant for all records. When DAFID is loaded, this parameter alone requires 400 kB per 100,000 records and is never used.

3.0 Recommendations

Based on the above findings and additional analysis of the prototype, the following changes are recommended.

- DAFID transaction files should remain on the CD-ROM with transaction codes in each record indicating whether the record is unchanged, new, or modified since the last cycle. A list of deleted records for the current cycle should also be included. The advantage in retaining the transaction files and a list of deleted records is that users could update only the individual records in their databases rather than reloading the entire database. (DAFID questionnaire C.3)

- The GPS almanac and magnetic data on the CD-ROM are useful to the users because they save time and the necessity of having to go through other routes to obtain these data. They should be retained. (DAFID questionnaire C.4)

- Other DMA products that could be combined with DAFID are Automated Air Facilities Information File and Digital FLIP. (DAFID questionnaire C.5)

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- The 21 ICAO files in DAFID should not be combined. Such combination would create a large file that may not be suitable for small computer systems. Also, this would be a step backwards toward the original DAFIF database. (DAFID questionnaire C.6)

- An alternative directory structure for DAFID would be to make the 21 regional subdirectories the directories and the current DAFID directories the new sub-directories. The advantage with this type of arrangement would be that the user could focus in on a single region of interest under one directory instead of moving from directory to directory to obtain data. (DAFID questionnaire C.6)

- MH-53 would prefer that records be entered alphabetically by airfield identifier instead of by the country code. (DAFID questionnaire C.7)

- Accessing the database would be even faster if the ICAO files were further broken down into files according to such parameters as identifier, latitude/longitude pair, and city name. (DAFID questionnaire C.7)

- The record length parameter "0208" is constant for all records. When DAFID was loaded, it cost MH-53 400 kB per 100,000 records and was never used. It should be deleted. (DAFID questionnaire C.7)

- TAMPS would like to see DAFID contain data on airfields with runways less than 3000 ft. (DAFID questionnaire C.7)

- A dial-up bulletin board service for DAFID transaction data would let the user update his database during the 28-day cycle. It could also be applied to the GPS almanac data. (DAFID questionnaire C.14)

4.0 Conclusions

The DAFID database is an improvement over the DAFIF database in that it will allow for quicker access to the data due to its format standardization and more divided structure. The inclusion of other related programs and databases on the DAFID CD-ROM makes access to related data and programs easier for the user.

5.0 Acknowledgments

Appendix. Users Questionnaire

USERS QUESTIONNAIRE
Digital Aeronautical Flight Information Data
DAFID CD-ROM Prototype

Please complete a separate questionnaire for each system or program that will use DAFID (DAFIF on CD-ROM) data. Please return the completed questionnaires to the following address as soon as possible:

> DMA Systems Center
> ATTN: DAFID Prototype Project, WGA/L-50
> 3200 South 2nd St.
> St. Louis, Missouri 63118-3399

If you need assistance, please contact Dan Rusco at (314) 263-4916 (DSN 693-4916) or Steve Richter at (314) 263-4920 (DSN 693-4920).

A. <u>User Background</u>

    1.   System or program name:

    2.   Program sponsor

    3.   Name & phone number of evaluator
            DSN:
            commercial:

    4.   Mailing address:

    5.   Date:

B. <u>Computer System Information</u>

    1.   List the make, model, word-size (e.g., 8-bit, 32-bit), and operating system (e.g., UNIX, system V, VAX/VMS, MacOS, MS-DOS, etc.) for each computer in your system that can/will use DAFID:

    2.   Do any of your computer systems have memory/storage limitations or other constraints that may affect DAFID utilization? If so, please describe:

    3.   Do your systems use other CD-ROM products? If so, are they needed simultaneously; i.e., do your systems have/need multiple (or juke box) CD-ROM readers? Please describe:

USERS QUESTIONNAIRE
Digital Aeronautical Flight Information Data
DAFID CD-ROM Prototype

C. Evaluation of Prototype DAFID CD-ROM

    1.   Briefly describe your application for DAFIF. (e.g., update/maintain flight information database, direct use for flight planning, etc.)

    2.   Assuming that you have to write code to use the CD as a direct database, will the current format fixed records (in the DAFIF directory) or the proposed format (DAFID directory) be better?

    3.   Will you need transaction files in either format (DAFIF or DAFID), assuming the DAFIF CD-ROM is published each cycle (28 day)? Would you need transaction codes in each record of the proposed format indicating whether the record is unchanged, new, or modified since last cycle? Would you need a file of deleted records?

    4.   The CD contains GPS almanac and magnetic data. These data are also readily available via other media (bulletin board or floppy disk) and having them available on the CD saves transactions with these other media. Is this beneficial? (Storage requirements on the CD-ROM are not a constraint.)

    5.   Is there other data/information, algorithms/software (subject to DMA capability) that would make this a complete package so that you can operate directly from the CD-ROM?

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USERS QUESTIONNAIRE
Digital Aeronautical Flight Information Data
DAFID CD-ROM Prototype

6. In addition to, or instead of 21 (ICAO regions) files, would you like one combined file with all regions? Are there other, alternative, sort orders for the various kinds of records? Please describe.

7. Would you suggest making any improvements or changes to this prototype DAFID (not already described above)? If so, please describe them:

8. Do/will you use DAFIF/DAFID in conjunction with other digital MC&G products? If so, please list them and briefly describe how they will be used with DAFID.

9. Do you have any problems accessing or displaying DAFID records on your system? If so, please explain.

10. Other than the errata sheet (provided), did you find any problems with the data? If so, explain.

USERS QUESTIONNAIRE
Digital Aeronautical Flight Information Data
DAFID CD-ROM Prototype

11. Do you need the information as in the VERSION file in a specific format for your application?

12. What opportunities are opened for you by making this data available on compact, unalterable, nonvolatile, stable media in sufficient quantities? Please comment.

13. Would AAFIF on CD-ROM be beneficial? Please comment.

14. Would a dial-up bulletin board service (analogous to NAVINFONET) for DAFIF transaction data be beneficial? Please comment.

We thank you for your effort.

The DAFID Project Team
DMASC/WG